



Boston College CO₂ Levels and Air Pollution at Major Boston Universities

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INTRODUCTION

Air pollutants pose a hazard to public health and can lead to a myriad of different illnesses and ailments, including asthma, pneumonia, myocardial infarction, and lower lung functioning.¹ As a result, this study examines the pollutants Boston College currently measures and the university's overall emissions, which may be impacting the health of its students. Expanding on this, Boston College's current emissions were compared to other universities, including Harvard University and Boston University, to highlight areas where each could improve or follow the steps of another.

Research Questions:

- 1) Are Boston College's emissions lower or higher than other comparable universities?
- 2) What are emissions levels like around Boston College's campus and where can we improve?

METHODS

CO₂ - Boston College's carbon dioxide levels were measured at five different locations twice a day for three days each week, over a two week period using an Amprobe CO₂-100 hand-held carbon dioxide meter.

Statistics Analysis - SPSS was used to analyze the CO₂ data obtained around Boston College's campus in comparison with location, time of day, and whether the readings were taken on a weekday or weekend.

Gross Emissions per Student Full-Time-Equivalent (FTE) - Harvard University's gross emissions per student FTE were calculated by dividing Harvard's greenhouse gas emissions by their FTE. Boston University's gross emissions per students were calculated by dividing their greenhouse gas emissions by their FTE. The FTE of part-time students, when not provided, was calculated using a method developed by the integrated postsecondary education data system.²

Boston college emissions - Boston College's emissions were calculated by an outside consulting agency and provided by the university.

Table 1: Average CO₂ levels at five locations on Boston College's Chestnut Hill Campus

Location	Mean CO ₂ (ppm)	Std. Deviation
Outside McElroy Commons (1)	402.1875	10.01478
Outside Oniel Library (2)	400.8125	9.47431
Inside Oniel Library (3)	741.8636	88.36383
Outside of Carveran Commons (4)	398.8750	9.99917
Outside of Cheverus Dorm (5)	399.8667	13.58501

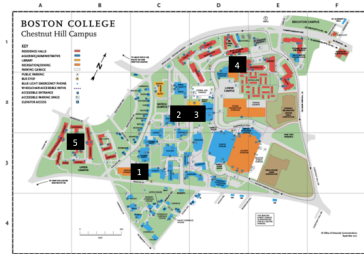


Fig. 1: Locations of CO₂ data collection on Boston College's Chestnut Hill campus.

Table 2: Two-Tailed ANOVA analysis on the difference between outdoor and indoor locations.

	Sum of Squares	Degrees of Freedom	F Value	P Value
Between Groups	3019944.759	4	224.721	.000
Within Groups	342685.540	102		
Total	3362630.299	106		

RESULTS

CO₂ - No significant difference was observed between locations, time of week, or time of day, meanwhile significantly higher levels were observed indoors (Table 2).

Comparison with similar universities - Boston College's energy consumption and gross emissions per student are lower on average compared to its regional peers and to other universities in the greater Boston area (Fig. 2) (Fig. 3).

Fig. 2: Gross Emissions per Student FTE comparison between Boston College and several comparable universities.

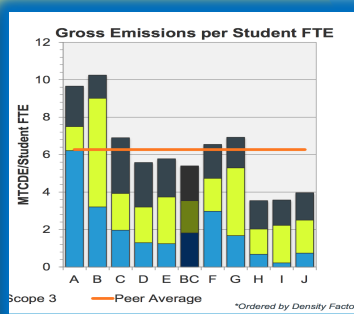
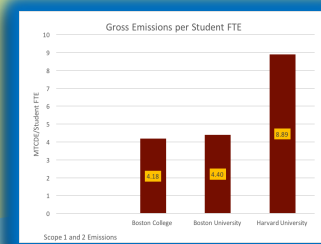


Fig. 3: Gross Emissions per Student FTE comparison between Boston College and local universities.



RECOMMENDATIONS

Greater monitoring of dangerous emissions in high traffic locations - Pollutants have been linked to dangerous health conditions like asthma over short time periods and, currently, there is minimal knowledge of the level of pollutants in the air on Boston College's campus.³

Greater monitoring of indoor pollutant levels - CO₂ was found to be much higher indoors and can impact cognitive function; therefore, Boston College should be more aware of these levels in densely populated locations around campus.

Greater efforts by Boston area schools to be leaders in this field and reduce their emissions to protect the overall health of Boston citizens - CO₂ was shown to be consistent throughout the campus, showing how these gases diffuse in our environment. The city's emissions affect the air we breathe and our emissions affect the rest of the city.

Sightlines Recommendations - to further reduce emissions, BC should work on their inefficient areas and outdated buildings -- Our emissions are greatly impacted by student and faculty travel, this is an area where the campus could improve to offset their total emissions.

DISCUSSION

Research Question 1 - Boston College's emissions are comparatively similar or lower than similar universities both in Boston and outside.

Research Question 2 - In general, emission levels are calculated at Boston College on a yearly basis rather than in specific locations and at specific times. While this provides Boston College with an overall sense of the university's emissions, it ignores some of the smaller problems like indoor CO₂ levels. These specific levels in specific locations are important to determining the potential health consequences of certain pollutants. CO₂ can affect cognitive functioning while other pollutants are linked to health conditions like asthma.³ Therefore, the high levels observed indoors could be having an impact on studying efficacy.



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References:

1. "Co-operative Studies on Priority Air Quality and Health Related Issues Asthma Research - A Background Paper," National Environment Protection Council, <http://www.nepc.gov.au/system/files/resources/220add0d-0265-9004-1d22-0c312998402c/files/qa-rsch-asthma-background-paper-200212.pdf>.
2. "Full-time Equivalent." Saint Mary's University of Minnesota. 2011. <https://www.smumn.edu/about/offices/institutional-research/>